

## SPECIAL ARTICLE



# Avicenna's concept of pain

Osama A. Tashani<sup>1,2,3\*</sup> and Mark I. Johnson<sup>1,2</sup>

<sup>1</sup>Centre for Pain Research, Faculty of Health, Leeds Metropolitan University, Leeds, UK; <sup>2</sup>Leeds Pallium Research Group, Leeds, UK; <sup>3</sup>Faculty of Science, Garyounis University, Benghazi, Libya

Ibn Sina (Latin name – Avicenna, 980–1037) is a famous Muslim physician who wrote *The Canon of Medicine*. Pain-related writings within *The Canon* were identified and analysed and compared to Galen and Modern Pain Theory. We found evidence in *The Canon* that Avicenna challenged Galen's concept of pain. Galen insisted that injuries (breach of continuity) were the only cause of pain. In contrast, Avicenna suggested that the true cause of pain was a change of the physical condition (temperament change) of the organ whether there was an injury present or not. Avicenna extended Galen's descriptions of 4 to 15 types of pain and used a terminology that is remarkably similar to that used in the McGill Pain Questionnaire.

Keywords: *Avicenna; Ibn Sina; Galen; McGill pain questionnaire; concept of pain; history of pain medicine*

Received: 27 April 2010; Accepted in revised form: 29 June 2010; Published: 8 September 2010

Ibn Sina was a famous Muslim philosopher and physician who was born in 980 at Bukhara (Uzbekistan) and died in 1037 at Hamadan (Iran) (1). In the West, Ibn Sina is more commonly known by his Latin name Avicenna. Most of his works were written in Arabic as it was the language of science at that time. Two of his books achieved an international circulation and influence and were translated into Latin, handwritten and reprinted many times after his death. *The Book of Healing* was, principally, Avicenna's interpretation of Aristotelian Philosophy although it also included chapters about metaphysics, psychology and other sciences. *The Canon of Medicine* was Avicenna's account of the sum of medical knowledge from the period in which he attempted to amalgamate the works of the famous Greek physician, Galen of Pergamum (129–200 AD) with known eastern medical practises, especially the work of Al-Razi [Rhazes (835–925)] in *Kitab Al-Hawi* (The Continens). Avicenna also added his own contributions in what became the reference of medicine for almost six centuries.

The Latin translation of *The Canon* was a major part of the syllabus at many European universities until late sixteenth century, including Montpellier, Leipzig, Tübingen, Vienna and Frankfurt-on-Oder (2). The general rule was 'a good doctor must be a good Avicennist' (3). When *The Canon* fell out of favour it was burned in Basel by Paracelsus (1493–1541) as an objection to the Avicenna doctrine (4).

Avicenna is held in esteem for many pioneering descriptions, including surgical procedures and diseases such as diabetes, although nowadays much of his work is studied for historical interest (5–7). Interestingly, few

modern-day scholars have explored Avicenna's understanding of sensation and pain. In the 1993 textbook, *The History of Pain*, Rey highlighted an absence of research into pain from Avicenna's era (8). However, only one page within this 409-page book was devoted to Avicenna's work. The aim here is to present and analyse Avicenna's writing on pain using an original Arabic manuscript of *The Canon* which was printed in Rome in the sixteenth century (9).

## Avicenna's description of pain within *The Canon*

*The Canon of Medicine* (in Arabic – *Kit\*ab al-Q\*an\*un f\*i al-.tibb*) is usually abbreviated as *The Canon* and comprised of five volumes. Each volume is subdivided into the modern equivalents of: Parts, Chapters, Sub-Chapters and Sections. The first volume 'The General Principles of Medicine' explains a definition of medicine and how it should be studied; this volume describes anatomy, the nature of health and disease, and principles of treatment. A general description of pain and its treatment is found in this volume. The second volume 'Single Medicines' explains pharmacy and principles of scientific investigation of the effect of medicines. The third and the fourth volumes are 'Diseases of Individual Organs' and 'General Diseases', respectively, in which Avicenna lists and describes diseases and fevers, surgical procedures, diagnostic criteria and treatment plans. His account on wounds, fractures, toxic substances, skin diseases and cosmetics are presented and discussed in these two volumes. There is also an extended chapter devoted to *Headache*. The last volume 'Pharmacopoeia' is a list of all known medicines and concoctions and how to

prepare and use them. Pain and its treatment are mentioned throughout all volumes although the major description of pain and analgesia are to be found in Chapter two of the first volume.

### Nature of pain (*Waja'*)

In the first volume, Avicenna defines the nature of pain and describes it in five pages (*The Canon*, pp. 54, 55, 61, 67 and 111) (9). He classifies pain into 15 types and relates each type to cause. He uses the word *Waja'* (hurt) as a general name for pain. However, he also uses *Alam* (pain) interchangeably with *Waja'* to describe how the patient feels. Nowadays, both words are in common use throughout the Arab-speaking world to describe painful conditions. However, in old Arabic usage *Waja'* also denotes the presence of a disease. To avoid confusion, modern Arabic texts use *Alam* as the scientific term for pain. Avicenna defined *Waja'* as 'one of un-natural (abnormal) conditions that affect the body' and that it is a 'feeling of incongruity'. He offers further clarity in the statement '*Waja'* is the sudden sensation of a different stimulus such as a sudden feeling of cold which leads to cooling of an otherwise hot organ' (*The Canon*, p. 54) (9). He provides an example of how a man would feel if he was exposed to changes in water's heat during a bath. If these changes are sudden then the man would experience pain. However, if the man's body gradually adapted he would not feel any pain. As an additional explanation of pain, Avicenna introduced pleasure as the opposite feeling to *Waja'*. Avicenna described pleasure as 'the feeling of a harmonizing stimulus' while pain was the feeling of 'an incongruous stimulus' (*The Canon*, p. 54) (9). Avicenna stated that any stimulus leading to pain or pleasure should produce changes in a sudden way; otherwise the body would not be able to feel anything. Avicenna associated the sense of touch with the strongest feelings of pleasure or pain but clearly acknowledges that other senses are able to produce both sensations.

Avicenna subscribed to Galen's description of temperaments (physical condition of organs: hot or cold and dry or wet) and humours (blood, yellow bile, black bile and phlegm). This humoral concept is associated with all Hippocratic writers but it possibly originated before Hippocrates. It was suggested that the four humours were description of different layers of blood if it was left in a container for an hour or more (10). The concept is simple: all health and illness conditions are the result of balance or imbalance of these four bodily liquids. Using Galen's terminology, Avicenna grouped *Waja'* into two broad categories. The first category describes *Waja'* according to sudden changes in temperament. He stated 'if the existing organ's temperament is changed to the contrary, becomes hotter or cooler, pain would be felt. If the changes persist, no more pain would be experienced'

(*The Canon*, p. 54) (9). Here, Avicenna implies the situation of adaptation to pain. The second category describes 'interruptions in continuity' which is a concept described by Galen as 'alterations' that break, cut, stretch or abrade (8). Avicenna criticised Galen for being dogmatic about the 'interruption of continuity' as the sole cause of pain as it implies that all stimuli must interrupt the nature of organs to cause pain. Avicenna maintained that some stimuli don't interrupt the nature of organs (i.e. do not cause injuries) and the true cause of pain is, therefore, the temperament change (i.e. a stimulus that alters the physical condition of organs). Avicenna also indicates that pain may persist even if the original stimulus had disappeared. He classified this pain as 'not true pain' and suggested that doctors should not attempt to treat it because the cause (i.e. the stimulus) 'does not exist'. This is consistent with modern pain theory which recognises that pain can often occur in the absence of injury.

Avicenna agreed with Galen that nerves carried pain sensation to the brain. Galen identified three conditions for pain perception: the organ to receive impression, a connecting passageway and an organisational centre (8). Avicenna wrote extensively about brain anatomy and its role as a centre for pain sensation. Both Galen and Avicenna believed that the brain was the principal organ for perception of pain. It is now well established that there are specialised (tissue injury) receptors in many different tissues of the body and their activation may lead to the sensation of pain which occurs in the brain (11). However, recent advances in pain research indicated that while this is enough to explain nociceptive pain, which is a physiological protective mechanism, it does not explain other types of pain such as neuropathic pain. The mechanism of generating inflammatory and neuropathic pain involve changes of nociceptors sensitisation, recruitment of new population of previously unresponsive receptors and changes in brain modulation and perception of pain (12), thus making devising one theory to how pain occurs an unrealistic approach.

### Types and causes of pain

Avicenna extended Galen's classification of four types of pain within *The Canon* and categorised 15 types of pain with their causes. These were: itching (exposure to irritating substance or salt); coarse (coarse substance); pricking (something stretches membranes); compressing; stretching (bloat or muscle or nerve stretch); disintegrating (a substance disintegrate inside the muscle and membranes); breaking (bone change); soft (muscle change); penetrating (a thick substance or bloat trapped in colon); stabbing, *Massli* (a substance trapped inside an organ); numbing (extreme cold or vessels obstruction); pulsating (a tumour or swelling close to arteries); heavy (a tumour or a swelling in lungs, kidney or spleen);

tiredness; and bitter (ulcers) (*The Canon*, pp. 54, 55) (9). Some of these terms are remarkably similar to those used in the McGill Pain Questionnaire (MPQ) (13) (Table 1). However, one should be cautious when cross-matching terms because the MPQ classifies an individual's report of their experience of pain whereas Avicenna classified types of pain based on cause. Further research into Avicenna's reasoning behind his classification would be interesting.

According to Avicenna, organs can be either sensitive or non-sensitive. Sensitive organs produce pain sensation if stimulated while non-sensitive organs like the upper part of the stomach may transmit other sensations like the feeling of the 'weight of tumour' while no pain sensation is associated with it. Avicenna further explained how movement, bad substances and bloats cause the sensation of pain. Most of these changes lead to a stretch, pressure or distortion of organs and membranes which in turn causes pain.

### Effects and diagnostic value of pain

Avicenna realised the devastating effects of pain and identified two major outcomes 'interruption of the functions of organs and persistent heat production'. Within the volume entitled 'The General Principles of Medicine', Avicenna included a chapter about Signs and Symptoms in which he described 'The most serious symptoms of

"swellings" and "interruption of continuity" are those arising from sensitive nervous organs and include fainting due to pain, or seizure'.

Avicenna appeared to appreciate the importance of pain in medical diagnosis and refers to pain as a diagnostic criterion throughout *The Canon*. In a chapter about tumours, Avicenna wrote 'External tumours can be seen and inspected. Internal ones are recognised by associated fever or by the feeling of heaviness if they are in insensitive organs. Feelings of heaviness are accompanied by pain in sensitive organs' (*The Canon*, p. 61) (9). He develops a detailed discussion on how to use knowledge about the source and type of pain to diagnose the nature of swelling and its location. A comparison of Avicenna's discussion with clinical reasoning used in modern-day pain medicine would be interesting. However, Avicenna considered alterations in pulse and urine, rather than pain, as more important indicators of the condition of the body and devoted extended chapters to diagnosing general signs of disease with little mention of pain.

### Pain relief

Avicenna called pain relief '*Taskeen* of Pain' which literally means 'making pain quiet'. In modern Arabic language *Taskeen* has become the equivalent of 'Analgesia'. Avicenna included a three-page chapter entitled 'Pain Analgesia' in which he suggested that doctors should always seek the cause of pain through proper diagnosis and that treatment of pain should be directed to the cause of the pain.

He described three general analgesic protocols: 'temperament change'; 'matter dissolving drugs'; and 'anaesthetics'. Avicenna described temperament change in a chapter devoted to General Treatment as a 'change of the condition of an organ from cold to hot or vice versa'. Avicenna believed that the factors affecting temperament included changes in food, climate, rest, exercise, sleep and emotions. An example of Avicenna's temperament change protocol was 'walking a long distance, listening to nice music which induces sleep or engaging in pleasurable experience can be powerful analgesics' (*The Canon*, p. 111) (9). In the volume 'Single Medicines', Avicenna referred to 'Matter dissolving drugs' as relaxants or softeners and included linseed and chamomile. These were not antispasmodic as translated by Shah in 1966 (2).

Avicenna referred to 'anaesthetics' as *Mokhader*. *Mokhader* has a range of meanings including a place of tranquillity, especially for women, and a description of an inebriated man. The word *Mokhader* was in common use before Avicenna's writings to describe a recipe used to dull the sensation. For example, Rhazes (835–925) used opium as *Mokhader* prior to surgery. In the fifth volume 'Pharmacopoeia', Avicenna included ice as *Mokhader* and he also listed a variety of plants with hypnotic,

**Table 1.** Comparison of Galen's, Avicenna's and modern classification of pain types

Galen's <sup>a</sup>	Avicenna's types of pain	McGill Pain Questionnaire <sup>b</sup>
	<i>Similar or comparable types</i>	
Pulsating	Pulsating	Pulsing, Throbbing, Beating
Lancinating	Stabbing	Stabbing, Lancerating, Cutting
Weighty	Heavy	Heavy, Dull, Aching
Stretching	Stretching	Tugging, Cramping, Taut
	Soft	Tender
	Itching	Itchy, Pricking, Stinging
	Breaking	Splitting, Tearing, Cutting
	Tiredness	Tiring, Exhausting
	Coarse	Rasping
	Disintegrating	
	Pricking	Pricking, Stinging, Itchy
	Penetrating	Penetrating, Stabbing, Lancinating
	Compressing	Squeezing, Pinching, Crushing
	Numbing	Numb
	Bitter	

<sup>a</sup>Based on Rey (8).

<sup>b</sup>MPQ (10).

anaesthetic and analgesic action including mandragora or nightshade, opium and henbane (14). Avicenna advocated the use of various recipes of these agents for anaesthesia and analgesia before surgery and was aware of the strength and potential toxicity of some of the formulas. Avicenna advised doctors not to use strong analgesics unless it was absolutely necessary. Avicenna appeared to distinguish between drugs that induced sleep and those that helped to 'dull the sensation' (15), although he also claimed that 'Anaesthetics might relieve pain by inducing sleep'.

## Conclusions

The virtues of Avicenna as a writer and a scholar of Medicine are well known within the Muslim world and beyond (1). In *The Canon*, Avicenna uses a style of writing which is elegant, eloquent and articulate, and the quality of his deductive reasoning is clearly visible and has been acknowledged by modern historians (8). Avicenna's originality in his investigations of a range of anatomical and surgical issues contributed much to those fields (17, 18). Nevertheless, Avicenna's theories and his contribution to medical knowledge has been challenged with claims that Avicenna did not develop Galen's ideas to any appreciable extent (3, 16). Our analysis of *The Canon* suggests that Avicenna built on Galen's concept of pain by insisting that pain does not necessarily have to result from an ongoing injury. He also gave a more detailed description of types of pain.

Further critical investigation of the writings of Islamic scholars on the science and practice of pain medicine is welcomed, as they are often neglected in historical accounts. Such investigations will not only provide a historical context for medical anthropology but will inform current practices such as Greco-Arab Medicine which is still practised in a number of places in the Islamic world today.

## Conflict of interest and funding

The authors have not received any funding or benefits from industry to conduct this study.

## References

1. Qashsh E. Avicenna's al-Q\*an\*un f\*i al-.-tibb [The canon of Medicine]. Beirut: Mu'as'sasat Ez Eldin; 1993.
2. Shah MH. The general principles of Avicenna's Canon of Medicine. Karachi: Inter Services Press; 1966.
3. Ulmann M. Islamic medicine. Edinburgh: Edinburgh University Press; 1978.
4. Goodman LE. Avicenna. London: Cornell University Press; 2006.
5. Eknayan G, Nagy J. A history of diabetes mellitus or how a disease of the kidneys evolved into a kidney disease. *Adv Chronic Kidney Dis*. 2005; 12: 223–9.
6. Naderi S, Acar F, Mertol T, Arda MN. Functional anatomy of the spine by Avicenna in his eleventh century treatise *Al-Qanun fi al-Tibb* (The canon of medicine). *Neurosurgery* 2003; 52: 1449–53. (Discussion 1453–4)
7. Aciduman A, Belen D, Simsek S. Management of spinal disorders and trauma in Avicenna's Canon of medicine. *Neurosurgery* 2006; 59: 397–403. (Discussion 397–403)
8. Rey R. History of pain. Paris: Éditions La Découverte; 1993.
9. Avicenna. *Kit\*ab al-Q\*an\*un f\*i al-.-tibb* [The canon of medicine]. Rome: Typographia Medicea; 1593.
10. Hart GD. Descriptions of blood and blood disorders before the advent of laboratory studies. *Br J Haematol*. 2001; 115: 719–28.
11. Belmonte C, Cervero F. Neurobiology of nociceptors. London: Oxford University Press; 1996.
12. Cervero F. Pain theories. In: Basbaum and Bushnell, editors. *Pain science*. London: Elsevier; 2009. p. 5–10.
13. Melzack R. The McGill Pain Questionnaire: major properties and scoring methods. *Pain*. 1975; 1: 277–99.
14. Aziz E, Nathan B, McKeever J. Anesthetic and analgesic practices in Avicenna's Canon of Medicine. *Am J Chin Med*. 2000; 28: 147–51.
15. Ansary ME, Steigerwald I, Esser S. Egypt: over 5000 years of pain management – cultural and historic aspects. *Pain Pract*. 2003; 3: 84–7.
16. Savage-Smith E. The practice of surgery in Islamic lands: myth and reality. *Soc Hist Med*. 2000; 13: 307–21.
17. Caggiati A, Bergan JJ. The saphenous vein: derivation of its name and its relevant anatomy. *J Vasc Surg*. 2002; 35: 172–5.
18. Mannan AA, Kahvic M. Ibn Sina: a tribute. *Gulf J Oncol*. 2010; 7: 60–3.

### \*Dr Osama A. Tashani

The Centre for Pain Research  
Faculty of Health  
Leeds Metropolitan University  
Civic Quarter, Leeds LS1 3HE, UK  
Tel: +44 (0) 113 2832600 ext. 23858  
Email: o.tashani@Leedsmet.ac.uk